

REMARKS

The above amendments and following remarks attend to each and every rejection and objection presented in the pending January 16, 2008 Office Action. Claims 1-14, 26 and 27 are pending in the current application. Claims 1, 6, 9, 12 and 26 are independent claims. Claims 1, 6, 9 and 12 have been amended. Support for these amendments is found throughout the specification, and for example FIGs. 2-5. Claims 2, 5, and 21-27 have been canceled. No new matter has been added through these amendments.

In the present office action, the Examiner has offered the very general statement, "The claims are rejected for substantially the same reasons set forth under the Double Patenting, 35 USC 102 and 103 rejections." It is therefore presumed that the Examiner is making reference to his earlier rejections as stated in the Office Action of August 13, 2007. However, the Examiner does state that the prior 112 rejection is withdrawn.

In light of the lack of specific rejections to specific claims, this response has been prepared in light of the rejections and claim groupings provided in the August 13, 2007 office action. It is further noted that claims 21-25 were noted by Examiner as being withdrawn from consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention – the election having been made without traverse.

Moreover, this response below sets forth argument responding to 102 and 103 issues of rejection as best may be inferred. In light of the Examiner's failure to properly identify specific rejections in reference to specific claims, and to articulate the basis of these rejections, Applicant respectfully requests latitude in the presentation of these response arguments.

Double Patenting

Claims 1-16 and 21-27 were provisionally rejected under the judicially created doctrine of non-statutory obvious type double patenting as being unpatentable over copending Application No. 10/736600, copending Application No. 10/736753 and US Patent No. 7,212,487. An appropriate terminal disclaimer together with the requisite fee will be submitted when and if the copending Applications 10/736600 and 10/736753 issue as patents. Further, deferral of a response to this rejection is requested until patentable subject matter has been indicated by the PTO, at which time a terminal disclaimer will be filed (or arguments made as to why the this rejection is incorrect).

Claim Rejection – 35 U.S.C. §102

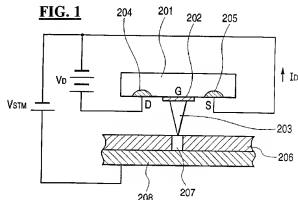
Claims 1-3, 9-10, 12-14 and 26-27 have been rejected under 35 U.S.C. § 102(b) on the basis of being anticipated by US Patent 6,477,132 to Azuma et al. (hereinafter, "Azuma").

Claims 1, 2, 6 and 9 have been rejected under 35 U.S.C. § 102(b) on the basis of being anticipated by US Patent 7,054,257 to Binnig et al, (hereinafter, "Binnig"). Applicant respectfully disagrees and traverses these rejections.

With respect to Examiner's § 102 rejection, respectfully, to anticipate a claim, Azuma and Binnig **must teach each and every element of the claim**, and "**the identical invention must be shown in as complete detail as contained in the ... claim.**" *MPEP 2131* citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989) (emphasis added).

Applicant respectfully submits that many differences exist in the claimed elements between Azuma and Applicant's claimed invention and Binnig and Applicant's claimed invention such that neither Azuma nor Binnig can not be said to anticipate Applicant's invention. Applicant has amended independent claims 1, 6, 9 and 12 to further define the invention. As applicant has canceled claims 2 and 26-27 the issue of those claim rejections is now moot.

A brief review of Azuma may be beneficial in appreciating how and why Azuma fails to anticipate claims 1, 9 and 12. Moreover, Azuma teaches a cantilever main body **201** made of a p-type semiconductor that is typically Si doped and having two n-type semiconductor regions **204**, **205** that are used as source (S) and drain (D). An electroconductive sensing needle **203** is connected to an electrode formed on an insulating layer disposed between the Drain **204** and Source **205** and **operates as a gate with the electrode**. Collectively these components provide a field effect transistor (FET). Reference symbols **206** and **207** denote respective portions of a thin film adapted to record information as a function of a local change in the electric conductivity of a thin film disposed upon a substrate **208**. Col. 6, lines 24-54 and FIG. 1



When information is recorded by storing locally an electric charge on a recording medium or by locally inverting the spontaneous polarization of the recording medium that is made of a ferroelectric thin film, the presence or absence of a recording bit, or the presence or absence of a stored electric charge or the difference in the orientation of polarization, is converted into a difference in the electric potential of the electroconductive sensing needle or a difference in the orientation of dielectric polarization in the electroconductive sensing needle. The gate voltage of the field effect transistor in the vicinity of the threshold value V_T is fluctuated by that conversion, and the channel between the drain and the source

of the field effect transistor is turned ON/OFF or the channel resistance is modulated depending on the difference in the gate voltage of the transistor so as to output a binary signal corresponding to the recorded information. Col. 7, lines 24-39

Moreover, the electroconductive sensing needle **203** conducts current directly from the electrically conductive thin film upon the substrate **208** to the gate electrode **202** disposed upon the channel. As the electroconductive sensing needle **203** passes from areas of high connectivity **207** to low connectivity **206** the channel is activated and deactivated in response to the current as provided to the gate. No apparent change in distance between the channel and the substrate **208** is disclosed.

A brief review of Binnig may be beneficial in appreciating how and why Binnig fails to anticipate claims 1 and 6. Moreover Binnig teaches an AMF-based storage device.

A read/write component **1** of the AFM-based data storage device is shown schematically in FIGS. 1a to 1c of the accompanying drawings. The component **1** comprises a generally U-shaped cantilever **2** which is connected to a support structure **3** (only partially shown in the figures). Flexing of the legs **2a**, **2b** of the cantilever **2** provides for substantially pivotal movement of the cantilever about a pivot axis **P**. The read/write tip **4** is provided on a heater **5** which forms a platform at the end of the cantilever **2**. The highly-doped silicon cantilever legs **2a**, **2b** define a current path connecting the heater platform **5** between a pair of electrical supply lines (not shown) on the support structure **3**. In operation, the read/write tip **4** is biased against the surface of a data storage medium indicated schematically at **6** and shown here in cross-section. Here, the storage medium comprises a silicon substrate **6a** and a 40 nm-thick polymer surface layer **6b**.

In the write mode, the heater platform **5** can be heated to a writing temperature T_w by application of a write-mode potential across the supply lines. The consequent heating of the tip **4** results in heat transfer to the polymer surface layer **6a** causing local melting of the polymer. This allows the tip **4** to penetrate the surface layer to form a pit, or bit indentation, **7** as shown in FIG. 1a. Such a pit represents a bit of value "1", a bit of value "0" being represented by the absence of a pit. The storage medium **6** can be moved relative to read/write component **1** allowing the tip to write data over an area of the surface, or "storage field", corresponding to the field of movement.

In the read mode, the heater platform **5** is used as a thermal sensor by exploiting its temperature-dependent resistance. A read-mode potential is applied across the supply lines to heat the heater to a reading temperature T_R which is less than the writing temperature T_w and not high enough to cause melting of the polymer. As the storage field is scanned by the tip **4**, the pivotal position of the cantilever **2** at each bit position differs according to the presence or absence of a pit **7**. In the absence of a pit, as shown in FIG. 1b, the distance between the heater platform **5** and storage medium **6** is greater than the corresponding distance when a pit is present, and the tip enters the pit, as shown in FIG. 1c. Heat transport across the air gap between the heater **5** and storage medium **6** is thus more efficient when a pit is present at a bit position, and since more heat is then lost to the storage medium, the temperature of the heater **5**, and hence its resistance, will be reduced. Thus, as the storage field is scanned, the data bits are detected by monitoring changes in the temperature of the heater **5**, in practice by monitoring changes in the voltage across a series resistor in one of the supply lines. Col 6, line 48 - Col. 7, line 30

Moreover, Binnig utilizes temperature-dependent resistance for the determination of a pit or a flat space. Binning does not disclose the use of a field effect transistor, or any transistor for that matter.

In contrast to Azuma, Claims 1, 9 and 12 recite (emphasis added):

1. A sensing system comprising:
 - a cantilever disposed with a medium which is movable relative to the cantilever;
and
 - a device associated with a distal end of the cantilever, the device having a source, a drain and a channel therebetween;
 - an electrically non-conductive probe disposed upon the either the source or the drain and separate from the channel;**
 - the medium having a non-conductive media disposed upon a conductive substrate, the non-conductive media having a surface in contact with the probe, the surface providing data indicative topographical features to vary the proximity distance between the substrate and the channel;**
 - a sensor circuit structured and arranged to develop a bias voltage between the source and drain and substrate;
 - wherein varying proximity between the substrate and the channel effectively gates the device and modulates current flow from the source to the drain through the channel as a read signal.**
9. A read mechanism used in a contact atomic resolution storage system, comprising:
 - a cantilever disposed with **an electrically non-conductive medium** which is movable relative to the cantilever;
 - a device associated with the distal end of the cantilever, the device having a source, a drain and a channel
 - the cantilever having **an electrically non-conductive probe extending from either the source or the drain** and in contact with a surface of, **the surface providing data indicative topographical features to vary the proximity distance between the substrate and the channel;**
 - a circuit which establishes an electrical connection between the cantilever and substrate on which the media is supported, and generates **an electric field in an air gap between the cantilever and the medium;** and
 - wherein the device is responsive to changes in the electric field in the air gap due to varying distance between the channel and the substrate, **a reduced distance providing a stronger field across the air gap to effectively gate the device.**
12. A method of using a sensing device comprising:
 - moving an electrically non-conductive probe supported on a cantilever relative to a non-conductive medium that has a data indicative elevationally varying topography followed by the probe, the medium being associated with a substrate producing an electric field; and**
 - sensing the change in distance between the cantilever and the medium using a change in current flowing through a FET (Field Effect Transistor) formed in the cantilever, wherein the change in current is induced by a change in electric field between the substrate and the FET, the FET having a source, drain and channel therebetween, the probe extending from either the source or the drain; and wherein the medium is configured so that a superficial data indicative topographical feature varying the proximity distance between the substrate and the channel is located in operative proximity to the channel of the FET.**

With respect to these claims it is clear that Azuma fails to anticipate Applicant's invention on several counts. For example, Azuma fails to teach:

- 1 – an electrically non-conductive probe;
- 2 – a non-conductive media having a surface in contact with the probe;
- 3 – the surface of the non-conductive media providing data indicative topographical features that vary the proximate distance between the substrate and the channel;
- 4 – the varying proximity between the substrate and the channel acting to gate the device; and
- 5 – that the non-conductive probe is disposed upon either the source or the drain and is separate from the channel.

Azuma clearly discloses that the probe is conductive and joined to an electrode so as to act as a gate electrode for the channel. Azuma further discloses that the medium provides data as areas of low conductivity and areas of high conductivity – not physical topographical variations of the surface which provide varying proximity between the substrate and channel. Indeed Azuma specifically discloses, and requires a gate electrode in contact with the channel which is entirely absent from applicants provided claims. Moreover, Azuma clearly fails to teach each and every element of the claim as **"the identical invention must be shown in as complete detail as contained in the ... claim."** /*Id.* Though other differences exist as well, the lack of any one of the above recited elements, let alone all of them is such that Azuma can not be said to anticipate Applicant's invention as set forth in claims 1, 9 or 12. Withdrawal and allowance of claims 1 and 12 is therefore requested.

Claim 2 has been canceled so the issue of its rejection is moot. Claims 3 depends from claim 1, claim 10 depends from claim 9 and claims 13-14 depend from claim 12 and therefore benefit from like argument incorporated herein, and are therefore also not anticipated by Azuma. Withdrawal and allowance of claims 3, 10, 13 and 14 is therefore respectfully requested.

In contrast to Binnig, Claims 1 and 6 recite (emphasis added):

1. A sensing system comprising:
 - a cantilever disposed with a medium which is movable relative to the cantilever;
and
 - a device associated with a distal end of the cantilever, the device having a source, a drain and a channel therebetween;**
 - an electrically non-conductive probe disposed upon the either the source or the drain and separate from the channel;**
 - the medium having a non-conductive media disposed upon a conductive substrate, the non-conductive media having a surface in contact with the probe, the surface providing data indicative topographical features to vary the proximity distance between the substrate and the channel;
 - a sensor circuit structured and arranged to develop a bias voltage between the source and drain and substrate;
 - wherein varying proximity between the substrate and the channel effectively gates the device and modulates current flow from the source to the drain through the channel as a read signal.**
6. A read mechanism used in a contact atomic resolution storage system, comprising:
 - a cantilever disposed with an electrically non-conductive medium which is movable relative to the cantilever, the cantilever having an electrically non-conductive probe which follows an elevationally varying topography of the medium and provides a varying proximity distance between the cantilever and a substrate on which the medium is supported; and
 - a device formed in the cantilever which responds to a change in electric field induced by a change in distance between the cantilever and the substrate the device having a source, drain and a channel, the probe extending from either the source or the drain and being separate from the channel; and**
 - wherein varying proximity between the substrate and the channel effectively gates the device and modulates current flow from the source to the drain through the channel as a read signal.**

With respect to these claims it is clear that Binnig fails to anticipate Applicant's invention on several counts. For example, Binnig fails to teach:

- 1 – a device having a source, a drain and a channel;
- 2 – an electrically non-conductive probe disposed on either the source or the drain;
- 3 – varying proximity between the substrate and the channel;
- 4 – the varying proximity between the substrate and channel gating the device.

Indeed Binnig discloses nothing what so ever with regard to a source, a drain and a channel – the terms do not exist in Binnig reference. Moreover, Binnig clearly fails to teach each and every element of the claim as **"the identical invention must be shown in as complete detail as contained in the ... claim."** *Id.* Though other differences exist as well, the lack of any one of the above recited elements, let alone all of them is such that Binnig can not be said to anticipate Applicant's invention as set forth in claims 1 or 6. Withdrawal and allowance of claims 1 and 6 is therefore requested.

Claim Rejection – 35 U.S.C. §103

Of the remaining claims, Examiner appears to reject claims 3, 4, 6, 7, 8, 10, 11, 12, 13 and 14 under 35 U.S.C. §103(a), as being unpatentable over Azuma in view of Binnig, claims 4 and 11 in further view of US 4,538,165 to Chang et al., hereinafter "Chang", and claim 5 in view of Binnig in view of US 6,665,258 to Dietzel et al., hereinafter "Dietzel". Applicant respectfully disagrees with and traverses these rejections.

The test for determining if a claim is rendered obvious by one or more references for purposes of a rejection under 35 U.S.C. § 103 is set forth in *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, 82 USPQ2d 1385 (2007):

"Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." Quoting *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966).

As set forth in MPEP 2143.03, to ascertain the differences between the prior art and the claims at issue, "[a]ll claim limitations must be considered" because "all words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385. According to the Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in view of *KSR International Co. v. Teleflex Inc.*, Federal Register, Vol. 72, No. 195, 57526, 57529 (October 10, 2007), once the aforementioned *Graham* factual inquiries are resolved, there must be a determination of whether the claimed invention would have been obvious to one of ordinary skill in the art based on any one of the following proper rationales:

- (A) Combining prior art elements according to known methods to yield predictable results;
- (B) Simple substitution of one known element for another to obtain predictable results;
- (C) Use of known technique to improve similar devices (methods, or products) in the same way;
- (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- (E) "Obvious to try"—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;
- (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, 82 USPQ2d 1385 (2007).

The principle references of Azuma and Binnig have been discussed above. Although perhaps related the field of data storage, the Examiner has failed to properly note the significant differences set forth by the present claims. Dietzel, disclosing a Method and Apparatus for Recording, Storing and Reproducing Information and Chang, disclosing a FET with Heterojunction Induced Channel do not cure the underlying and fundamental incongruity of Azuma and Binnig.

Moreover, it is noted that before even proceeding to the above rationales, the guidelines clearly state that, "the key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting *In re Kahn*⁴¹ stated that " '[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)., and see *KSR*, 550 U.S. at 1, 82 USPQ2d at 1396. Moreover, a combination of relevant teachings alone is insufficient grounds to establish obviousness, absent some reason for one of ordinary skill in the art to do so. *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988).

To briefly generalize from above:

- Binnig discloses a probe tip as a heater and does not disclose a FET. Binnig discloses the use of temperature-dependent resistance and not activation of a channel in a transistor.
- Azuma discloses a conductive probe tip coupled to an electrode to effectively provide a gate electrode. Azuma further discloses that the media provides data in the form of a local change in the electric conductivity of a thin film, not a physical topographical surface feature. Azuma gates the device by varying current supplied through the conductive probe tip from varying areas of high and low conductivity in a thin film layer. Azuma does not physically permit movement of the channel into and out of an electric field as provided by the substrate to gate the channel.

Although other differences certainly exist, these are critical to the teachings of each reference and cannot be ignored. Indeed a large number of devices may exist in the prior art where, if the prior art is disregarded as to its content, purpose, mode of operation and general context, the several elements claimed by the Applicant, if taken individually, may be disclosed. However, the important thing to recognize is that the reason for combining these elements in any way to meet Applicant's claims only becomes obvious, if at all, when considered from hindsight in the light of the application disclosure. The Federal Circuit has

stressed that the "decisionmaker must step backward in time and into the shoes worn by a person having ordinary skill in the art when the invention was unknown and just before it was made." *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566 (Fed. Cir. 1987). Therefore, if the above-identified criteria are not met, then the cited reference(s) fails to render obvious the claimed invention and, thus, the claimed invention is distinguishable over the cited reference(s). Respectfully, the October 16, 2007 Office Action has failed to meet this burden.

The guidelines under KSR echo this point, and evidence how and why Examiner's view of obviousness from the combination of references is unfounded.

For a combination of references to be proper there must be:

1 - a finding that the prior art included each element claimed with the only difference between the claimed invention and the prior art being the lack of actual combination.

This is not done - Azuma discloses a conductive probe, and further that the probe is directly connected to an electrode disposed upon the channel. Applicant discloses a non-conductive probe and clearly shows in FIGs 2-5 that the probe is not disposed upon the channel. Binnig discloses a heat conducting probe and the use of a heater with temperature-dependent resistance rather than FET modulation.

2 - a finding that one of ordinary skill in the art could have combined the elements as claimed by known methods, and that in combination, each element merely would have performed the same function as it did separately.

This is not so - The probe in Azuma conducts current from the media directly to the channel. Distance between the cantilever and the media is constant. The probe in Binnig conducts heat. The probe presented by applicant is non-electrically conductive and offers nothing with respect to heat. The probe presented by applicant and the data indicative topographical features vary the proximate distance between the substrate and the channel.

3 - a finding that one of ordinary skill in the art would have recognized that the results of the combination were predictable.

This is not so - The modifications required to combine the principle references of Azuma and Binnig are so significant and contrary to the teachings of each reference that the results are in no way predictable.

4 - any additional findings.

The Examiner has offered only generalized speculation as to how and why such combinations of the references would be obvious, which is in error.

Respectfully, "***If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the reference are not sufficient to render the claims prima facie obvious.***" *In re Ratti* 270 F.2d 810, 123 USPQ 349 (CCPA 1959) (comment added).

Without some reason in the references to combine the cited prior art teachings, with some rational underpinnings for such a reason, the Examiner's conclusory statements in support of the alleged combination fail to establish a prima facie case for obviousness. *See, KSR International Co. v. Teleflex Inc.*, No. 04-1350, 550 U.S. ____ (2007) (obviousness determination requires looking at "whether there was an apparent reason to combine the known elements in the fashion claimed....," citing *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness," *KSR* at 14).

As the prior art references do not combine to render obvious claims 3, 4, 6, 7, 8, 10, 11, 12, 13 and 14, Applicant respectfully submits that the Examiner has not made a prima facie case of obviousness for the elements of claims 3, 4, 6, 7, 8, 10, 11, 12, 13 and 14. For at least these reasons, withdrawal of the Examiner's rejection and allowance of claims 5-6, 3, 4, 6, 7, 8, 10, 11, 12, 13 and 14 is therefore respectfully requested.

Conclusion

In view of the above Remarks and the amendment to the claims, Applicant has addressed all issues raised in the Office Action dated January 16, 2008, and respectfully solicits a Notice of Allowance for claims 1, 3, 4 and 6-14. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Applicant believes that no fees are due; however, should any fee be deemed necessary in connection with this Amendment and Response, the Commissioner is authorized to charge deposit account 08-2025, referencing the Attorney Docket Number 200310876-1.

Respectfully submitted,

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